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## Grinding head

## Description

5 The invention relates to a grinding head with a disk-shaped basic body which carries a plurality of rotatably driven grinding disks, with a flexible drive, mounted in a housing, for a drive shaft having a spherical driving head on which is seated a two-part  
10 connection piece which is mounted so that it can pivot about a driver pin of the driving head, with a rotationally fixed transmission connection between the driving head and flexible drive means for driving the rotatably mounted grinding disks, and with a high-  
15 reduction transmission between the driving head and the disk-shaped basic body.

There is already known a generic grinding head (DE 198 37 218, A1) which is designed as a closed  
20 structural unit and has not only a first spherical bearing, which between a carrier and a drive member for the carrier mounted in a frame, but also a universal joint which has the same center point as the first spherical bearing and connects the grinding disks  
25 spherically in a freely pivotable manner to a drive shaft extending coaxially to the drive member.

This main grinding head requires considerable structural outlay owing in particular to the two spherical bearings and is not variable to the desired degree owing to its closed design, being unsuited in particular for combination with other grinding devices.

30 By contrast, the object on which the present invention is based is to provide a structurally simple grinding head in which the rotational speed of the individual grinding disks substantially exceeds that of the carrying disk-shaped basic body and which can be

combined with grinding devices of other designs, even with grinding devices of prior art designs.

This object is achieved according to the invention with  
5 a grinding head of the initially mentioned type in that  
the grinding head is formed from three assemblies which  
can be detached from one another, specifically a drive  
part seated in a housing, a transmission part and a  
10 disk-shaped basic body, in that the transmission part  
has a central body for coaxially receiving the  
connection piece so that it can rotate, in that the  
high-reduction transmission is mounted radially outside  
the central body and is secured to the housing on the  
one side and has its high-reduction part for  
15 transmitting the rotational movement connected to the  
radially inner disk body of the basic body, in that the  
disk body is seated rotatably on a hub which engages in  
a socket of the transmission part in a positively  
locking manner, and in that a central driver disk for  
20 driving the grinding disk is arranged on the hub in a  
rotationally fixed manner.

Dividing the grinding head according to the invention  
into three assemblies makes it possible for the drive  
25 part to be able to be combined with a transmission part  
and subsequently with a disk-shaped basic body to form  
a unit. It is thus possible to operate with basic  
bodies of different designs, in particular to match the  
diameter and/or the overall height to the use  
30 conditions by making use of various basic bodies.

It is furthermore possible to connect to the drive unit  
disk bodies on which the individual grinding disks are  
not caused to rotate by means of a mechanical drive but  
35 by means of friction on the surface to be ground. In  
this way it is possible to achieve particularly small  
dimensions, like those found at some workstations  
(distance between slide sealing surfaces).

According to the invention, the grinding heads can operate with chains or toothed belts as flexible means. The selection will be made by the user according to the particular circumstances.

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Provision may also be made according to the invention for the high-reduction transmission to be a harmonic drive transmission. This type of transmission has become known for similar devices, in particular because 10 of its relatively small overall size and its simultaneously high step-down ratio.

The grinding head according to the invention can also be designed in such a way that the grinding disks are 15 each seated on pivotably mounted levers for the purpose of adjusting their distance from the center point of the basic body. This arrangement of the grinding disks is known per se. It allows the grinding disk positions to be matched to the respective structural conditions 20 and at high rotational speeds permits good material removal results on the item to be ground, in particular if the grinding disks are rotationally driven.

Provision may also be made according to the invention 25 for a flexible drive element for driving the grinding disks to run around the central driver disk and further driver disks which are in drive connection with the individual grinding disks.

30 Finally, provision is made according to the invention for a stop to be provided on that side of the transmission part which faces the drive part and to butt in a blocking manner against the drive part during the rotational movement of the transmission part about 35 its axis. This very simply ensures the required locking of one side of the high-reduction transmission. If the direction of rotation of the drive changes, the stop then assumes a blocking position where the stop butts against the other side of the drive part. Such a set-up

can be even further simplified by providing two such stops which are placed in front of or behind the drive part in the direction of rotation.

5 The following part of the description will describe some embodiments of the grinding head according to the invention with the aid of drawings, in which:

10 fig. 1 shows an axial section through an embodiment of the grinding head according to the invention;

15 fig. 2 shows an exploded representation of the grinding head according to fig. 1;

15 fig. 3 shows an axial section through an alternative embodiment of the disk-shaped grinding body;

20 fig. 4 shows a plan view of an embodiment of a disk-shaped basic body with grinding bodies seated on pivoting arms;

25 fig. 5 shows a view of the rear side of the arrangement represented in fig. 4;

25 fig. 6 shows an axial section through an embodiment according to the invention of the drive unit with non-driven grinding disks, and

30 fig. 7 shows an exploded representation of the arrangement according to fig. 6.

35 The grinding head according to figs. 1 and 2 features a drive part 1, a transmission part 2 and a disk-shaped basic body 3.

The transmission part 2 has a housing 4 on which is seated a drive motor (not shown) which acts via a flexible drive means, i.e. a chain or toothed belt, on

a wheel 5 which is secured to and drives a drive shaft 6. The shaft 6 has a spherical driving head 7 with a drive pin 8. The driving head 7 is enclosed by a two-part connection piece 9 which is mounted movably about the drive pin 8 with respect to the driving head 7. A guide section 10 projects from the connection piece 9.

5 The transmission part 2 has a central body 15 with a socket 16 into which the connection piece 9 is plugged and is secured by means of screws 17.

10 The central body 15 is surrounded by a bearing section 18 which is preferably formed from a harmonic drive transmission. A stop 19 projecting in the direction of the drive part 1 is provided in this bearing section 18, said stop engaging behind the housing 4 in the assembled state and thus blocking a rotational movement of the associated part 20 of the bearing section 18 in the respective direction of rotation of the shaft 6. 15 The opposite part 21 of the bearing section 18 is then caused to rotate at a greatly reduced rotational speed.

20 The disk-shaped basic body 3 has a socket 25 which receives the facing side of the transmission part 2 up to the stop 26 on the transmission part 2. In this position there results a positively locking connection between a mounting opening 27 in the transmission part 2 and a shaped pin 28 which is seated on a hub 29 on which a disk body 30 is rotatably secured. Screws 31 produce a firm connection between the disk body 30 and the part 21 of the bearing section 18 of the transmission part 2. Consequently, the greatly reduced rotational speed in the part 21 of the bearing section 18 is transmitted to the disk body 30.

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On the hub 29 is seated a driver disk 32 which is coupled via a flexible drive means to a driver disk 33, the axle 34 of this driver disk forming the point of rotation of an arm 35 at whose radially outer end a

grinding disk 36 is mounted on a shaft 37. A further driver disk is seated on the axle 34 and is coupled to the driver disk 39.

5 To ensure an exact alignment of the assemblies with respect to one another, fits are provided in particular at the transition between the connecting piece 9 and the transmission part 2, between the transmission part 2 and the hub 39 and between the transmission part 2  
10 and the disk body 30.

Fig. 3 shows an embodiment of the disk-shaped basic body 3 according to the invention which deviates from that described above in that in this case the grinding 15 disks 40, of which only one is represented, are arranged so that they can rotate on the basic body in a fixed position. The rotational speed present at the connection piece 9 of the drive part 1 is transmitted via the socket 16 to the hub 29 and to the driver disk 20 32 firmly connected to said hub. A flexible drive element then results in a corresponding rotational movement of the axle 34 of the grinding disk 40. The rotational connection of the disk body itself is produced by means of the above-described connection 25 between the transmission part 2 and the socket 25.

Figs. 4 and 5 represent front and rear views of a disk-shaped basic body which is provided with pivotable arms 35 which are able to pivot on the shafts 37 in order to 30 match their radial position with respect to the grinding disk 40 to the respectively required dimensions.

Fig. 4 shows clearly that, in this exemplary 35 embodiment, a flexible drive means 46 starting from the driver disk 32 serves the driver disks of all shafts 37 and thus drives them. Additional rollers 47 are provided to guide the flexible drive means.

Figs. 6 and 7 illustrate that, with the drive part 1 unchanged, it is also possible to operate with grinding disks 48 which are caused to rotate solely by their friction on the surface to be processed upon rotation 5 of the disk-shaped basic body. Such a disk-shaped body can thus be readily fitted onto a connection piece 9 which then engages in a socket 49. The use of such basic bodies may be entirely expedient owing to particular spatial conditions, for example owing to the 10 spatial conditions.

Accordingly, the overall result is that the grinding head according to the invention can be matched with 15 versatility to conditions arising in practice since the drive unit can be combined with various basic units and transmission units having various designs.

**List of reference numbers**

- 1 Drive part
- 2 Transmission part
- 5 3 Disk-shaped basic body
- 4 Housing
- 5 Wheel
- 6 Drive shaft
- 7 Driving head
- 10 8 Drive pin
- 9 Two-part connecting piece
- 10 Guide section
- 11
- 12
- 15 13
- 14
- 15 Central body
- 16 Socket
- 17 Screws
- 20 18 Bearing section
- 19 Stop
- 20 Part
- 21 Part
- 22
- 25 23
- 24
- 25 Socket
- 26 Stop
- 27 Mounting opening
- 30 28 Shaped pin
- 29 Hub
- 30 Disk body
- 31 Screws
- 32 Driver disk
- 35 33 Driver disk
- 34 Axle
- 35 Arm
- 36 Grinding disk

- 37      Shaft
- 38      Driver disk
- 39      Driver disk
- 40      Grinding disks
- 5        41
- 42
- 43
- 44
- 45
- 10      46     Flexible drive means
- 47     Rollers
- 48     Grinding disks
- 49     Socket